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(12) (19) (CA) **Brevet-Patent**

(11) (21) (C) **2,010,057**
(22) 1990/02/14
(43) 1990/10/13
(45) 1997/12/09

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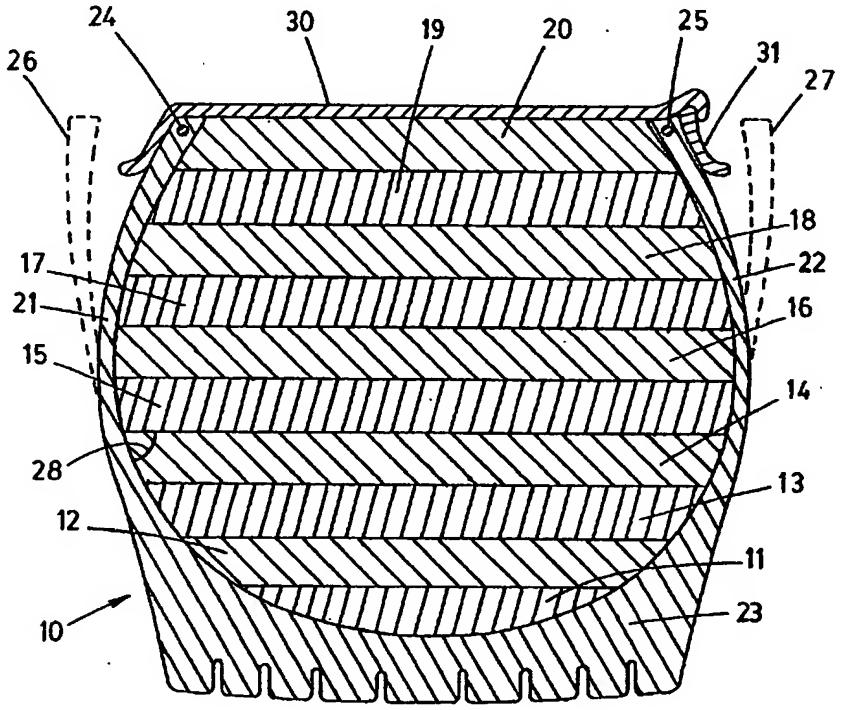
(51) Int.Cl.[6] B60C 5/08
(30) 1989/04/13 (337,760) US

(54) **MODE D'INSTALLATION D'UNE GARNITURE ELASTOMERE DANS UNE ENVELOPPE DE PNEU**

(54) **METHOD OF INSTALLING AN ELASTOMERIC FILL FOR USE IN A PNEUMATIC TIRE CASING**



(57) Bourrage sur tringle pour pneus, comportant des bandes allongées de caoutchouc mousse haute densité précuites dans des moules plats, ayant des contours à coupe transversale pour adopter la forme voulue lorsque faisant partie d'une série de bandes, de manière à s'ajuster contre la surface intérieure avoisinante de la carcasse de pneu correspondante, en vertu du fait que le bord latéral allongé de chaque bande est formé en angle par rapport à la surface allongée opposée de chaque bande, pour faciliter un ajustement serré des unes par rapport aux autres et à la paroi intérieure de la carcasse du pneu. Le bourrage est de dimension supérieure à celle

(57) A tire filler comprises elongated strips of high density foam rubber pre-cured in flat moulds and have transverse cross-sectional contours such as will conform when one of a set of the same, to fit snugly against the interior surrounding surface of the associated tire carcass in virtue of the elongated side-edge of each strip being formed in angular relationship to the opposite elongated face-surface of each strip to facilitate snug fittment with one another and the tire casing carcass inner wall. The filler is dimensioned to 'overfill' the carcass of the tire casing and the filler is installed by first spreading apart the opposite side walls of the carcass. The filler is

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de la carcasse du pneu et est installé, dans un premier temps, en écartant les bords latéraux opposés de la carcasse. Il est inséré dans la carcasse en couches concentriques de manière à ce que les bords latéraux allongés de dimension prédéterminée de chaque bande ou couche adjacente soit adjacente à la surface intérieure avoisinante de la carcasse du pneu. Lorsque les bords sont relâchés, ils demeurent en position écartée jusqu'à ce qu'ils soient pressés ensemble au moment de l'installation du tout sur le talon du pneu, tassant ainsi les couches dans la carcasse pour former une roue avec pneu mis sous pression de manière à pouvoir accepter une charge.

inserted into the casing in concentric layers such that the pre-dimensioned elongated side-edges of each adjacent strip or layer are in substantially smooth co-term inous relationship against said interior surrounding tire carcass surface. When the walls are released the casing hold a spread-apart mode until they are pressed together on installation of the combination on a rim thereby packing the layers into the casing to create a wheel and tire combination pressurized for load bearing capability.

ABSTRACT OF THE SPECIFICATION

2010057

A METHOD OF MANUFACTURING AND INSTALLING AN ELASTOMERIC FILL, FOR USE IN A PNEUMATIC TIRE CASING

A tire filler comprises elongated strips of high density foam rubber pre-cured in flat moulds and have transverse cross-sectional contours such as will conform when one of a set of the same, to fit snugly against the interior surrounding surface of the associated tire carcass in virtue of the elongated side-edge of each strip being formed in angular relationship to the opposite elongated face-surface of each strip to facilitate snug fittment with one another and the tire casing carcass inner wall. The filler is dimensioned to 'overfill' the carcass of the tire casing and the filler is installed by first spreading apart the opposite side walls of the carcass. The filler is inserted into the casing in concentric layers such that the pre-dimensioned elongated side-edges of each adjacent strip or layer are in substantially smooth co-terminous relationship against said interior surrounding tire carcass surface. When the walls are released the casing hold a spread-apart mode until they are pressed together on installation of the combination on a rim thereby packing the layers into the casing to create a wheel and tire combination pressurized for load bearing capability.

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A METHOD OF MANUFACTURING AND INSTALLING AN ELASTOMERIC FILL FOR USE IN A PNEUMATIC TIRE CASING

BACKGROUND OF THE INVENTION

Field of the invention

The invention shown herein relates to a novel method of manufacturing an elastomeric fill for fitting to the inside of a pneumatic tire casing and in a novel method of fitting the fill into the casing to provide a soft-core flat-proof tire. The invention contemplates extruding and moulding strips of elastomers to pre-determined dimensions in accordance with various sizes of tire casings to be filled thereby creating fills that can be shipped to remote locations, such as mines, to be installed into the pre-determined size of tire casing as required. The elastomer can be extruded and moulded into large flat sheets and shipped to the remote location where slitting machines can be employed to dimension the side edges to interfit the tire casing in the increasing and decreasing widths as the tire casing dimension requires.

Description of the Prior Art

It is known to provide a pneumatic tire casing with a fill to create a flat-proof assembly when fitted to a wheel of a vehicle. One common method is to assemble the tire and wheel and employ a valve to fill the cavity with a hardening material, under pressure which when in place can be allowed to harden and create the fill. One such material is urethane liquid accompanied by a hardening agent. Other polymers can be used and can be cured within the casing. The disadvantage of the known methods is that the filling is done while the tire casing is on the wheel and the curing and vulcanizing of the fill often requires a factory site and a separate mould for each size of casing and wheel. Where a soft-core fill is required to provide the soft ride desired by users of filled tires the elastomer must be vulcanized in the casing under pressure to provide the proper pressure to the tire as would a tube and its air fill under pressure. It has been proposed that the fill be made and vulcanized outside the casing by means of manufacture under super atmospheric conditions but the art has not been disclosed.

DISADVANTAGES OF THE PRIOR ART

It is known that solid tires give a rough ride and now are not acceptable to machine operators who must drive them during a whole working day. Urethane filled tires ar not acceptable to machine operators and especially truckers where there is any possibility that vehicle speeds are to be attempted because of the heat build-up between the rubber tire casing and the Urethane fill. Furthermore Urethane is expensive and will be lost when the tire carcass is worn out and must be discarded. Filled tires have a high rolling resistance which results in a rough ride and high fuel consumption. Filled tires are difficult to retread and due to the problem of stretching it is known that filled tires will become loose at the rim and loose pressure.

Where solid unvulcanized polymers other than urethane are used as tire fills similar problems are encountered especially reversion to liquid when used at higher speeds when heat is generated between the casing and fill. reducing the polymer to mush which would leak out any loose rim or cut in a wall or puncture. Low density foamed rubber would be good if it could hold its strength at high speed use. High density rubber would of course be too heavy. The best known of the presently used tire fill systems is the use of high density foam rubber. When high density foam rubber is employed and installed in concentric rings there is the known additional advantage of reuseability when the casing is discarded. A disadvantage of the pre-manufactured rings is that as there are so many different shaped sizes of tire and casings on the market that a small dealer cannot service all makes without having a huge stock of different shaped rings to properly service all makes.

OBJECTS OF THE PRESENT INVENTION

The principal object of the present invention is to provide a means of filling many different shapes of tires with a polymeric filler which can be easily made and inserted in a large or small shop or in the field with the minimum of skill and equipment.

It is another object of the invention to provide a polymeric fill for a tire casing which gives a ride comparable to a pneumatic tire but which is puncture resistant and flat-proof.

Another object of the invention is to provide a method of manufacturing a variety f fill members that will fit different sizes of casings by extruding moulding and curing the polymer in strip form having the thickness and side edges of the fill members predetermined by the mould and then providing a cross-cutting step to create a layer of the strip suitable for fittment in one of a plurality of the layers of the fill.
A further object of the invention is to install the layers of fill with the total volume of layers making up the fill to be equal to or greater than the internal volume of the casing to allow the fill to be pressed into the casing when fitted to a wheel. to result in a tire and wheel combination having load bearing capabilities.

SUMMARY OF THE INVENTION

The invention disclosed herein contemplates the teaching of a process and method of making a reuseable fill in the form of concentric layered strips of high density pressurized foam rubber installed into a pneumatic tire casing. The invention comprises the steps of; Extruding into a curing mould of a sheet or strip of high density foam rubber where the mould sides are shaped to create on the moulded cured strip a shape compatible with the taper of the inside of the casing wall of a tire to be filled.
Fiting the strips in layers into the tire casing, each of the layers being cut and dimensioned by width and length to fit in close snug abutment with its ends to itself and in its sides to the casing walls and succeeding layers; Spreading open the casing walls at the bead area of the tire to receive the inner layers of the fill in an expanded or overfill mode; Releasing the spread-open casing walls to thereby contain the concentric layers together tightly in the casing. Forcing a wheel rim onto the filled tire casing under pressure to create a tire-wheel combination for load-bearing road use.

IN THE DRAWINGS

With the foregoing objects in view and such advantages or novel features as may become apparent from consideration of this disclosure and specification the present inventi n

consists of the concept which is comprised, embodied and embraced and included in the methods or use of the methods and arrangements, or any new use of the foregoing, herein exemplified in the specific embodiment of the concept, reference being had to the accompanying drawing.

Figure 1, is a view of a section of a tire casing cut from tread to bead giving section by section the layers of fill mating one with another and tapered during moulding differently by degrees along their mating edges with the casing wall. The dotted lines show the position of the walls when the casing is spread open to receive the upper or last layers which are overly wide by predetermined amounts to cause the required internal fill pressure when the wheel rim has been pressed over the beads.

Detailed Description

Numeral 10 designates a pneumatic tire casing shown cut in profile to reveal the cross section of the casing walls 21, 22, and the tread area 23 and the bead portions 24, 25. The dotted line 26, 27 part of the drawing designates the profile of the casing walls as spread open by a tire spreader to receive the layers of foam rubber. The layers are designated 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, and are from one quarter inch to one inch in thickness are of variable widths. Each layer has been designed and shaped by the flat cure mould to have a variable angle 28 of contact with the side wall of the casing as predetermined by calculating the angle of contact at that point in a casing when the casing is under load and pressurized. The over-volume of the upper layers 14- 20 is determined by the degree of pressure required for the casing under load. All these calculations are first made to determine the size of layer or strip to be moulded and the flat mould set up to accept the extrusion of polymer for curing to the shape desired. A long roll of the particular designed strip can be made and subsequently cross cut to the length desired for a particular casing. In practice and for most uses a number of the layers are made similar and are interchangeable in the casing except for length.

With the aid of a tire press the casing with its layers of fill in place within it is pressed onto a wheel rim 30 and then a lock ring 31 is forced over the one side of the casing to pack the fill in the casing and to maintain the casing tire carcass on the wheel at the predetermined pressure.

Method of Installation and Manufacture procedure of the fill of the invention

The determination of the quantity of fill to be packed into a tire casing and the type of elastomer is done by the manufacturer and a table given to the installer for size and type of tire and usage so that in a remote field station or in a mine the proper fill can be quickly and properly done without experimentation. The angle 28 to which the strip of elastomer has been moulded or cut along its side edges can vary, not only with the casing wall slope into which it mates, but also with the type of elastomer used. When the foam level of the elastomer is high (high % of air cells) then the angle can be less exact and critical than with a more solid foam. The packing of the layers one with the other will cause the highly foamed type of fill to conform by itself along the side edge to the mor rigid carcass wall allowing the manufacturer to provide the field installer with only two or three different strips for cross-cutting as required to fit the tires in his use. It is understood that the volumne of fill for a tire is determined in the usual way by taking the inner volumne of the casing under load and the angle 28 for any layer will be determined by taking a profile of a tire under load and calculating the angle 28 of a layer that will be positioned at any one of the 3, 5 or 10 layers that are required for the particular carcass. All the calculations are made at the factory and the installer need only to refer to a table setting out the required fill for any tire size to provide a desired load carried by that particular tire. In this way the principal object of the invention is fullfilled; namely, the provision of a novel tire fill that can be easily installed by workmen at remote sites where large inventories of fills is not desirable.
One of the preferable fill materials is high density foam rubber. A further step of pumping urethane into a filled tire casing will provide a universal fitment system.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

An improved pneumatic to solid tire system wherein the original tires are of the type having at least a carcass including beads, a tread, sidewalls extending between the beads and the tread, and a casing comprising the interior surface of the carcass;

said tire fitting against the rims of a wheel with said beads contacting the interior surfaces of the rims and wherein said rims are of the type fitted with lock rings;

said tires having solid fill material introduced into the casing thereof;

the improvement wherein the fill consists of a set of fillers, each said filler comprising an elongated strip of high density foam rubber of a length and transverse cross-sectional contour which will conform, when one of a superimposed set of said fillers is fitted snugly against the interior surrounding surface of the tire carcass, to the said interior surrounding surface, by virtue of an elongated side-edge of each strip being in angular matched relationship to said interior surrounding surface;

the strips of the fillers proximate the beads of the tire being oversized to cause a force fit between the beads of the tire and the rims of the wheel;

and wherein the said set of fillers are installed by first spreading apart the sidewalls of the tire, inserting said set of fillers in concentric layers while ensuring that said elongated side edges of each adjacent strip are in substantially smooth co-terminus relationship with said interior surrounding surface and finally releasing said side walls so that as they squeeze back to-gether, said strips of fillers, except those proximate the tire bead, will remain in an unstressed state.

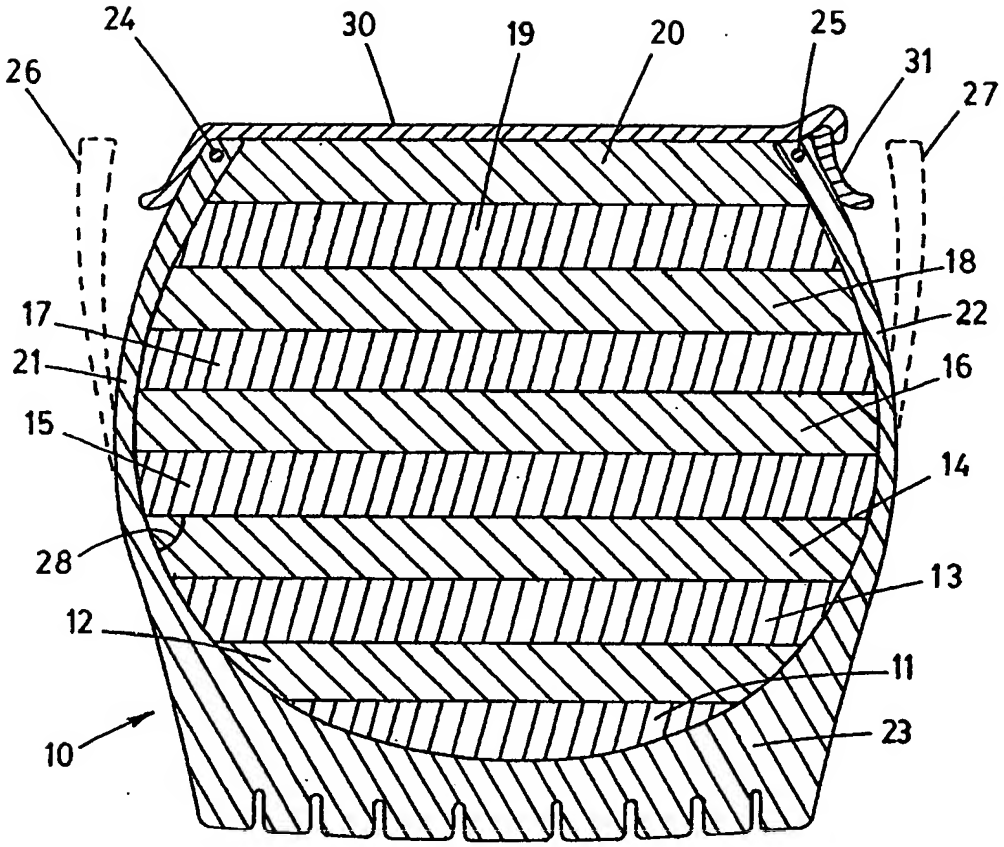

FIG. 1

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Patent agent.